TABLE OF CONTENTS FOR ENVIRONMENTAL RESTORATION PROGRAM DIVISION ADMINISTRATIVE PROCEDURES MANUAL

INFORMATION ONLY

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE	**Manual No.:**	**2-11000-ER-ADM (a.k.a. 3-21000-ADM)**
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ERPD ADMINISTRATIVE PROCEDURES MANUAL	**Page:**	**2 of 3**
	Effective Date:	**11/10/94**
CATEGORY 1	**Organization:**	**Environmental Restoration**

Rocky Flats Environmental Technology Site

2-G24-ER-ADM-19.01

REVISION 0

ENVIRONMENTAL RESTORATION PROGRAM DIVISION SOFTWARE MANAGEMENT PLAN

APPROVED BY: S.G. Shaw / S.G. Sliger / 9-26-94

Director, / Print Name / Date

EG&G Environmental Restoration Program Division

for RSL / MARK C. Brooks / 9-23-94

Quality Assurance Manager. / Print Name / Date

Data Management and Reporting Services

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Analytical Services
Data Management and Reporting Services
Environmental Operations Management
Information Resources
Rocky Flats Environmental Database Systems
Operating Unit Closure

USE CATEGORY 3

ORC review not required

The following have been incorporated in this revision:
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1-58	10-21-94	93-DMR-CCC923

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TABLE OF CONTENTS

TABLE OF CONTENTS

1. PURPOSE

This plan provides instructions and program implementation for software management practices used by the Environmental Restoration Program Division (ERPD).

2. SCOPE

This plan applies to all EG&G Rocky Flats, Inc. Environmental Restoration Program Division personnel, matrixed support organizations, and subcontractors.

This plan applies to internally developed software programs that routinely provide data management, data reduction, or reporting that supports the ERPD mission.

This plan addresses the following:

- Level 1 Software
- Level 2 Software
- Level 3 Software
- Implementation Plan

Consistent with Department of Energy (DOE) Order 1330.1D, plant policies, and Level 1 plant procedure, the following software or computer systems applications are excluded from Software Management Plan (SMP) controls.

- Limited use software and systems providing calculations or other support to scientific investigations. These programs are generally designed to reduce data for a specific small-scope investigation, and are not used to reduce, tabulate, or summarize ERPD data on a routine basis. These programs are not controlled by this SMP.

- Off-the-shelf commercial software that is not modified for use in ERPD operations. Typical examples include local area networks and word processing, spreadsheet, or presentation software.

- Firmware that is imbedded within an instrument or device. An example is calibration software imbedded in certain field instruments used to collect environmental data.

3. OVERVIEW

This SMP is designed to assure that the following basic objectives are met:

- Software programs perform as the user intended
- Software releases are tested and approved prior to use
- Software programs are developed and maintained in a systematic manner that reduces the risk of operational defects and failures

3. OVERVIEW (continued)

- A revision history is maintained to allow reconstruction of past conditions to troubleshoot application problems if needed.

Requirements for software management are applied in a graded approach so that the level of control is commensurate with system complexity and size. Large, complex systems with a relatively high failure risk due to improper development receive the top level of control, including independent reviews, verification, and validation testing. Smaller systems with lesser ERPD mission impacts or potential for failure due to improper development are subject to fewer controls. The controls applied to each configuration modification are determined, approved, and documented on a case-by-case basis. Consistent with plant policy, the ERPD organization defines three levels of control for software: Level 1 for large complex systems, Level 2 for smaller systems, and Level 3 for systems are not controlled by this plan.

Controls for Level 1 Software programs are applied to the following life cycle activities:

Phase I:	Change Request and Functional Requirements Definition
Phase II:	Conceptual Design and Alternatives Analysis
Phase III:	Detail Design and System Development
Phase IV:	Acceptance Testing
Phase V:	User Training and Systems Installation
Phase VI:	Production
Phase VII:	Retirement

A flow chart of the Level 1 system development phases, referencing responsible organizations and specific instructions is shown in Appendix 1, Level 1 Software Management Flow Chart.

Controls for Level 2 Software programs are applied to the following life cycle activities:

Phase I:	Functional Requirements Specification and Design
Phase II:	System Development
Phase III:	Acceptance Testing and Installation
Phase IV:	Production
Phase V:	Retirement

A flow chart of the Level 2 system development phases, referencing responsible organizations and specific instructions is provided in Appendix 2, Level 2 Software Management Flow Chart.

This plan establishes the overall infrastructure, specific responsibilities, standard formats, and instructions needed to support a Software Management Program that conforms to all internal and external requirements.

3. OVERVIEW (continued)

The ERPD organization will use a phased approach to bring all affected computer systems into compliance with this plan. If systems were developed without the use of design and configuration control procedures, a system baseline configuration assessment will be conducted prior to implementation of software Quality Assurance (QA) procedures specified in this plan. The objective of the baseline assessment is to characterize system database and software code structure in order to assign an initial revision release. Once the baseline configuration assessment is completed, all software program changes must follow this plan. The Rocky Flats Procedure 1-45000-CSM-001, Computer Software Management, requires a plan to implement requirements of this plan. The ERPD SMP implementation plan with specific task descriptions and responsibilities is provided in Section 9. Once the plan is implemented, it will be deleted from this document.

4. DEFINITIONS

Baseline. A specific configuration of computer hardware, software, or database structure that has been formally reviewed and agreed upon, and is at the point in the life cycle at which formal configuration control is applied. A baseline can be changed only through formal change control procedures. Baselines, plus approved changes from those baselines, constitute the current configuration identification.

Bundling. The process of collecting individual system change requests, assigning priority, and grouping them into an efficient unit of work. Bundling is conducted to allow system modification releases on a periodic and predictable schedule. The effect of bundling is to: a) level development effort required to support an application, b) provide enough time between releases for proper completion of all software development steps, and c) prevent excessive minor revisions to system configuration.

Computer System. A functional unit, consisting of one or more computers and associated software, that uses common storage for all or part of a program and also for all or part of the data necessary for the execution of the program; executes user-written or user-designated programs; performs user-designated data manipulation, including arithmetic operations and logic operations; and that can execute programs that modify themselves during their execution. May be a stand-alone unit or may consist of several interconnected units.

Computer System Manager (CSM). The functional line ERPD manager responsible for Level 1 and Level 2 software systems operations and maintenance. The individual Manager within an organization assigned responsibility for system management during all phases of development and use.

4. **DEFINITIONS (continued)**

Configuration Control Administrator (CCA). The individual assigned responsibility to ensure that only properly approved software and database structure modifications are installed for production use. The CCA (and assigned alternates as needed) is the individual assigned complete access to all database structures and application programs, and manages computer system access to ensure that only properly authorized individuals are permitted access. The CCA is ultimately responsible to ensure that all modifications are properly approved, and tested as applicable, prior to installation. For Level 2 software, the configuration coordinator may be the same as the CSM.

Configuration Control. The process of approval, controlled release, and change control of discretely defined software/hardware modifications. Controlled release of system modifications is defined as clear definition, appropriate functional testing and approval, and discrete identification of the modification using a unique control number. Each revision release is discrete in that it is generally designed, developed, and implemented as a unit of work. Configuration control precludes the unapproved access to, or modification of, baselined software and computing systems. Configuration control includes operating systems and Database Management systems. All ERPD Level 1 and 2 systems are configuration controlled.

Conceptual Design and Alternatives Analysis. Preliminary design and formal review of proposed software design and implementation alternatives for the purpose of detection and remedy of design deficiencies that could affect fitness for use and environmental aspects of the software, including the identification of potential improvements of performance, safety, and economic aspects. This process includes a "make or buy" determination. Individuals normally performing the analysis are the User Systems Manager (USM) and the Information Resources (IR) coordinator.

Data Management and Reporting Services (DM&RS) The direct-reporting organization responsible to manage data and maintain records for activities supporting the ERPD mission.

Data Model. A graphical depiction of the primary entities of interest and their hierarchical relationships. Data models may include information or work flow charts, charts of database structures or table relationships, entity-relationship diagrams, or other information. This model is included in the Conceptual and Detail Designs, Appendixes 7 and 9.

Emergency Change. Those system changes, deemed by the CSM and IR lead that require immediate corrective actions. Emergency changes may be necessary to restore system function or correct a specific assignable cause that is creating a problem with immediate adverse impacts on operations. The emergency change is the only situation that allows configuration control after the correction is made. All emergency changes shall be documented and the affected database or application program configuration revised to reflect the change as soon as practical after the change is completed.

4. **DEFINITIONS (continued)**

Environmental Restoration Program Division (ERPD). The organization with programmatic accountability for environmental restoration activities at the Rocky Flats Environmental Technology Site (RFETS).

Functional Requirements Specification (FRS). The FRS defines the primary and secondary software functions, interfaces; inputs, outputs, and processing to fulfill each requirement; applicable design and performance constraints; describes quantitative performance criteria; describes how requirements will be expressed in top-level design; and includes top level data flow diagrams. The FRS is developed using a graded approach commensurate with software complexity. An example template is shown in Appendix 6.

Installation Test. Testing performed to prove that a program has been successfully installed onto a designated hardware configuration. Successful completion of this testing signifies that the program is satisfactory for use by project personnel.

Limited Use Software. Specialized software that does not routinely support ERPD data management activities. These programs are generally designed to reduce data for a specific small-scope or limited duration investigation, and are not used to reduce, tabulate, or summarize ERPD data on a routine basis. Examples include electronic calculations or spreadsheet software used to reduce raw data and software that generates statistical summaries of scientific investigations. Controls for limited use software are specified in the ERPD Quality Assurance Program Document and a supporting procedure under scientific investigations.

Level 1 Software. Software and software systems that are large or expensive enough to require the support of the IR organization. IR is responsible for design, implementation, and maintenance of all information systems that have a multiple user environment of greater than 20 users, or those systems that are deemed by senior management to be of significant value to the Rocky Flats Environmental Technology Site (reference: Plant Policy 7-21, "Information Resources").

Level 2 Software. Software and software systems that do not require the support of the IR organization. These systems are generally supported by micro or mini computers and do not have a multiple user environment of greater than 20 users (reference: Plant Policy 7-21, "Information Resources").

Level 3 Software. Software and software systems that do not require controls specified in this plan.

Program Code Listing. A printed listing or magnetic media storage file of software instructions.

4. DEFINITIONS (continued)

Prototyping. An effective development method that emulates system input screens and output reports, usually for user demonstration and evaluation, to better define user needs and requirements. Prototype formats are typically prepared and demonstrated prior to completion of design or program coding. Evaluation of prototype formats provides input for final designs.

Reverse Engineering. The after-the-fact reconstruction of a set of specifications for complex software by an orderly examination of system components and their interrelationships. This process documents sufficient design-level understanding to aid maintenance, strengthen enhancement, establish baseline configuration, or support replacement or modification.

Rocky Flats Environmental Database System (RFEDS). The centralized repository for environmental data supporting regulatory programs at the RFETS.

Software. Computer programs, procedures, rules, and associated documentation pertaining to the operation of a computer system.

Software Development Validator. The DM&RS designated personnel that monitor the development status of all ERPD Level 1 and Level 2 software systems. The software development validator is responsible to review and assess the acceptability of test results and monitor the software development process for compliance to this plan.

System Change Request (SCR). The form used to initiate and control the modification, development, and reverse engineering of Level 1 ERPD software. An example is shown in Appendix 5.

Software Management Review Board (SMRB). The RFETS organization responsible for approving software activities that exceed $25,000 in resource expenditure (considered as total capital and labor cost).

Software Record Package. The complete software documentation, verification and validation test results and programs. The package includes the Software Configuration Change Request, Functional Requirements Specification, Conceptual and Detail Designs, Test Plans and Test Reports, Program Code Listing, User Training Rosters, and User Documentation.

4. DEFINITIONS (continued)

Software Review Board. The review board is formed on an ad hoc basis to assess the impact and implement an emergency software change. The board is responsible to collectively designate the change as one requiring emergency corrective action. The board is responsible to assure that emergency changes receive followup configuration change control. The board must have the following minimum membership: the involved Computer Systems Manager, the DM&RS Software Development Process Validator, and the User or USM representative.

Software Systems Request. The IR form that initiates the work related to computer systems design, development, installation, or use.

Test Plan. The document that prescribes verification and validation test methods, personnel, test features, pass or fail criteria and other test performance requirements. An example template showing required data elements for this document is shown in Appendix 10.

Test Report. The document that provides objective evidence of software verification and validation test performance. An example template showing types of data elements to be included in this report is shown in Appendix 11.

User. Typical Users include regulators, the DOE, and internal Rocky Flats organizations such as Environmental Protection Management and Analytical Services.

User System Manager (USM). An ERPD individual who acts as the primary interface between the users and the developers of software. For Level 1 systems, the USM may also be a member of the Plant Software Management Review Board.

5. REQUIREMENTS

This plan implements applicable DOE requirements as stated in:

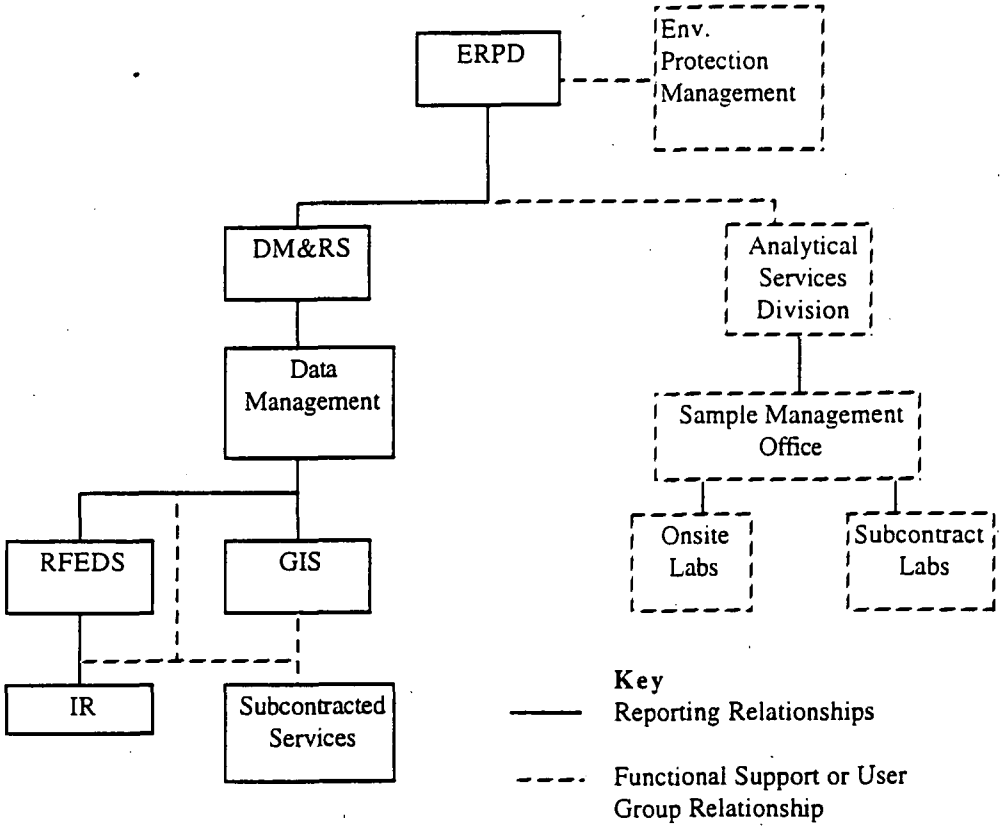
- EG&G Rocky Flats Quality Assurance Manual, Quality Requirement QR-11, Test Control.
- EG&G Rocky Flats Quality Assurance Manual, Quality Requirement QR-19, Software Quality Assurance.
- Environmental Management Quality Assurance Project Description (QAPD).
- 1-45000-CSM-001, Computer Software Management.
- 10CFR830.120, Quality Assurance

A flow chart of the requirements and the implementing procedures is shown in Appendix 3.

6. RESPONSIBILITIES

A generalized illustration of software management programmatic responsibilities is shown in Figure 1. The functional interfaces and responsibilities illustrated in Figure 1 are described below.

Figure 1 Software Management Functional Relationship Diagram



6.1 Computer System Manager

Assists the DM&RS organization to inventory and categorize by control level software in their areas of responsibility.

Performs baseline assessments of computer system databases and application programs to define an initial system revision release configuration.

Develops and maintains a System Change Request and priority log for Level 1 software.

Performs a preliminary impact analysis of the desired change to determine the effects the change request may have on the existing operations and data processing systems.

6.2 Computer Systems Security Officer (CSSO)

Evaluates functional requirements in accordance with security and asset protection criteria.

6.3 Configuration Control Administrator (CCA)

Provides proper, effective configuration control of application programs, operating systems and database management systems.

Ensures that all configuration changes are properly reviewed, tested and approved, as required, prior to installation for routine production use.

Coordinates with affected user organizations, all configuration change production releases in a manner that minimizes impact on existing data management operations.

Maintains the master system configuration control documentation that provides a current revision listing of all approved production applications, database management systems, operating systems and database structures.

6.4 Data Management and Reporting Services (DM&RS)

Inventories, assesses and monitors ERPD computer systems to determine Level of software control (1 or 2) applied to a particular system using the definition provided in this plan.

Maintains an annually updated listing of Computer Systems Managers for those systems under SMP control.

Provides Quality Engineers to review and assess acceptability of software development phases, documents, and test results as described in development flow charts and instructions.

Conducts hold point assessments and assures that a disposition of acceptance or rejection is documented.

Archives all software development records listed in the Records section of this plan in an indexed and retrievable manner.

6.5 Director Reporting Manager, Environmental Restoration Program Division

Ensures that all software programs used within their organizations are identified and assessed by DM&RS personnel to determine if SMP requirements are applicable.

Assigns single-point accountability in the person of a Computer System Manager for all systems that SMP requirements apply.

6.5 Director Reporting Manager, Environmental Restoration Program Division (continued)

Ensures that Computer Systems Managers and developers of controlled software comply with the requirements of this plan.

Assists the involved Program Manager and the ERPD Director, to assess and resolve work priority determinations for software development.

6.6 Information Resources (IR) Lead, Developer

Initiates software development projects as requested by the User or USM.

Estimates level of effort required to perform requested development.

Provides the User and Computer System Manager with a project schedule of major development milestones based on staff resources available and the project work priority assigned by the User and Computer System Manager.

Performs system development, configuration control, testing, installation and production according to approved procedures that implement accepted software development practices.

Prepares draft User Manuals and User Training guides that support implementation and use of computer system modifications.

Maintains an interim-status project file of software development QA records as they are generated.

Provides configuration control of software, application programs, and database structures.

Indexes and archives on hard copy, magnetic, or other storage media the historical and current revision releases of application programs and database structures.

6.7 Program or Operations Manager, Environmental Restoration Program Division

Ensures that each direct reporting organization provides required support and resources necessary to implement the requirements of this plan.

Monitors the implementation and compliance of ERPD software development operations to the requirements of this plan.

Supports corrective action measures as needed to assure effective software management.

Assists the involved Computer Systems Managers and Program Managers, as needed, to assess and establish work priority for software development that supports current ERPD needs and missions.

6.8 User

Provides adequate, documented definition of the desired change so that systems managers, developers, and testers can clearly understand the request.

Defines the need for the change, indicating the improvements or benefits to be realized by system modification.

Conducts software management system assessments.

Assist developers in preparing User's Manuals and implementation training.

6.9 User System Manager (USM)

Represents the interests of the User during software procurement or development.

Solicits information from computer system users to accurately determine what their needs are.

Acts as the primary interface between the plant Software Management Review Board and the operating organization regarding software activities.

7. TRAINING

This procedure is required reading in accordance with 1-10000-TUM, Training Users Manual

8. INSTRUCTIONS

NOTE 1 *The steps required to implement any given system change request will vary based on the magnitude and complexity of the request. The determination of the required steps is documented and approved on the Project Initiation and Development Processing (PI&DP) form.*

NOTE 2 *In addition, if tests or reviews are not acceptable, the involved developers, verifiers, and validators may use professional judgement regarding return to previous phases of development as needed. Flow charts depicting the development processes are provided in Appendixes 1 & 2.*

8.1 Control Level Assessment

Data Management and Reporting Services (DM&RS)

[1] Conduct an annual ERPD software inventory of each system that is subject to SMP controls and assign a control level designator to each inventoried computer system.

[A] Gather the following information and record on Appendix 4:

- System Purpose
- Hardware in use
- Software in use
- Primary users
- System Operator

ERPD Program or Operations Manager

[2] Assist DM&RS in completing the annual inventory by assigning point of contact personnel that are cognizant of computer systems used within the organization.

The point of contact may be the Computer System Manager (CSM) or Computer System Security Officer.

CSM, or Organizational Representative

[3] Provide computer system information to the DM&RS representative as requested.

DM&RS

[4] Distribute the Software Inventory Logsheet, including the control level designation to the:

- ERPD Director.
- Program Managers.
- CSM or System Operator.

[5] Maintain current inventory of ERPD controlled software.

8.2. Level 1 Software

NOTE: *Where multiple performers are indicated, the User may or may not be a required participant. Wherever the User is indicated assume the caveat "if required".*

8.2.1 System Change Request (SCR)

NOTE: *SCR forms and logsheets may be obtained from the Rocky Flats Environmental Database System (RFEDS). An example of the SCR form is shown in Appendix 4.*

Originating Change Requestor, USM

[1] Prepare a SCR Form.

[A] Describe the need as clearly as possible.

[B] Provide a preliminary assessment of benefit or uses and impacts to existing systems.

[2] Submit the SCR Form to the User System Manager (USM) or designated alternate.

USM

[3] Log in the SCR as received.

[4] Review the SCR to determine if all required information is present.

[5] Submit the SCR to the Computer System Manager on a routine basis.

The USM, CSM and Information Resources (IR) Lead meet periodically in order to bundle SCRs into work units described by a functional requirements document.

CSM, IR Lead

[6] Clearly define the desired change and type of action requested.

[7] Assign an initial work priority to the requested change.

[8] Bundle SCRs into a defined unit of work.

The SCR documents the need for software development, modification, emergency change, or reverse engineering.

8.2.2 Functional Requirements Preparation

NOTE *The USM may request an IR developer as needed to assist in the preparation of requirements. The objective is to clearly state the user's needs by defining output requirements, supporting input, projected hardware, storage, and database needs, etc.*

NOTE *User involvement is required by the PI&DP form.*

USM, User

[1] Prepare a functional requirements document according to the template provided in Appendix 6.

8.2.3 Functional Requirements Review and Approval

CSM, IR Lead,

[1] Review the Functional Requirements (FR) document for adequacy, and completeness, to verify that all applicable elements of the template in Appendix 6 are addressed.

[2] Document the review and a disposition of acceptance or rejection on the FR.

[3] **IF** the FR is acceptable to the reviewer,
THEN document the approval signatures on the FR.

[4] **IF** the FR is incomplete,
THEN return to Step 8.2.2[1].

CSSO

[5] Review the FR to ensure the FR has features that incorporate the following:

- Computer security
- Protection from unauthorized breach or access
- Protection of data in the event of catastrophic failure or power loss

8.2.4 Project Initiation, Scheduling, and Priority

CSM

[1] Prepares the Project Initiation and Development Processing (PI&DP) form provided in Appendix 8.

This form is used to document the graded approach to development of the specified functional requirements document.

[2] Select development steps based on a qualitative assessment of modification complexity and risk of failure.

8.2.4 Project Initiation, Scheduling, and Priority (continued)

CSM (continued)

[3] Document steps deemed unnecessary, including reason why performance of the step is not needed.

[4] Submit completed PI&DP form to the IR Lead.

IR Lead

[5] Initiate an internal review of the change request.

[6] Assign an IR-internal System Service Request (SSR) number to the work.

[7] Assign an IR developer to the project.

[8] Determine if a baseline configuration is established or needed for the requested change.

[9] Estimate resources required, both labor and capital expenditures, if applicable.

[10] Prepare a resource-loaded project schedule, using Microsoft Project, with milestone task completion dates.

[A] Develop the schedule considering:

- The current priority list (SCR Logsheet) maintained by the CSM.
- Integration with any ongoing development milestones.
- Developer resources available to perform the work.

[B] Document the information on the PI&DP form and return the form to the CSM.

USM, IR Lead, CSM

[11] Review the project objectives, resources required, and development steps employed for adequacy, accuracy, and completeness.

[12] **IF** the project definition is satisfactory,
THEN signature approvals are recorded on the form and work is authorized to begin.

[13] **IF** total development costs (labor and capital) exceed $25K,
THEN the CSM is responsible to notify the plant SMRB chairperson of the effort.

CSM

[14] Provide a short project description and an estimate of costs for all projects exceeding the threshold value to the SMRB chairperson.

8.2.4 Project Initiation, Scheduling, and Priority (continued)

USM, User

[15] **IF** the priority and completion dates established are **NOT** satisfactory, **THEN** process a priority petition.

[16] Obtain the signature of an involved Program Manager on the PI&DP form to increase the priority.

[17] Return the PI&DP form to the CSM.

CSM/IR Lead

[18] Revise priorities and assign resources.

Program or Operations Manager

[19] **IF** rush priority is needed that will delay other system application changes, **THEN** call a priority meeting or conference including the affected Manager.

[20] Establish software development priorities that support current ERPD needs.

[21] Document resolution of priorities by Program Manager's approval signatures on the PI&DP form.

8.2.5 Conceptual Design, Prototype, and Alternatives Analysis

IR Developer

[1] Prepare a Conceptual Design and Alternatives Analysis (CD&AA) document in accordance with the content requirements of the template provided in Appendix 9. Examples that a CD&AA might address include:

- Creation of a new table versus a new "user view" of existing tables.
- Using a DOS machine versus a MAC or DEC/VMS host.
- Using commercial user interface window software versus coding a menu.

The author of the CD&AA recommends one alternative based on its merits of cost, efficiency, ease of use, or other applicable criteria. A suggested method for exploring and refining application concepts is using prototype input and output that is evaluated by the User.

8.2.6 CD&AA Review and Approval

USM and IR Lead

[1] Review the CD&AA document for adequacy, completeness, and compliance to requirements specified in the FR.

[2] Document and disposition acceptance or rejection.

8.2.6 CD&AA Review and Approval (continued)

USM and IR Lead (continued)

[3] **IF** the CD&AA document is acceptable to the reviewers,
THEN document the approval signatures on the report.

[4] **IF** the CD&AA is not acceptable,
THEN return to Subsection 8.2.5 for corrective action.

8.2.7 Detail Design

IR Developer

[1] Prepare the following documents:

- Detail Design (DD) according to the template provided in Appendix 10.
- Draft User's Manual,
- Draft Training Guide

8.2.8 Detail Design Review and Approval

User, USM, and IR Lead

[1] Review the DD and supporting documents for adequacy and completeness.

[A] Limit user review to those items of direct User interest, such as input screens and output.

[2] **IF** the DD documents are acceptable to the reviewer,
THEN approve the report.

[3] **IF** the DD is not acceptable,
THEN return to Subsection 8.2.7 for corrective action.

8.2.9 Software Development

IR Developer

[1] Prepare the program code.

[2] Perform translation of design requirements into executable or compilable code according to industry practices that address:

- Module size.
- Internal documentation (commented code).
- Formatting and languages.
- Media.
- Naming conventions for files and variables.
- QA Records of the code.

8.2.10 Develop Test Plan

USM

[1] Prepare the test plan according to the template guidance provided in Appendix 10.

The test plan specifically addresses boundary conditions, special cases, and impact on other systems or data that may be impacted by the modification.

[2] Provide test data supporting each test case defined in the test plan.

IR Developer

[3] Assist Test Plan development as requested by USM.

8.2.11 Review Test Plan and User Documents

USM, User and IR Lead

[1] Review the test plan, User's Guide, and Training Guide for adequacy and completeness.

[2] Document the review with a disposition of acceptance or rejection.

[3] **IF** the test plan is acceptable to the reviewer,
THEN the approval signatures are documented on the plan.

[4] **IF** test plan is not acceptable,
THEN return to Subsection 8.2.10 for corrective action.

8.2.12 User Acceptance Testing and Report Preparation

IR Developer

[1] Conduct module and integration testing prior to user acceptance testing.

User, USM

[2] Conduct testing using the test plan with the assistance of the IR developer.

[A] Conduct testing on a separate account segregated from production data at minimum or on a separate server, if possible.

[3] **WHEN** test results satisfy the established criteria,
THEN prepare a report of the test results using the template provided in Appendix 11.

The test report provides documented evidence that the tested software meets applicable requirements stated in the FR, CD&AA, or DD.

8.2.13 Review and Disposition of Test Results

USM, IR Lead, DM&RS

[1] Review test results for adequacy, completeness, and compliance to test plan acceptance criteria.

[2] **IF** the test results meet plan criteria,
THEN document approval on the test report.

[3] **IF** test results are **NOT** satisfactory,
THEN the developer and USM may return to whatever development phase is necessary to correct the software.

CCA

[4] **WHEN** software testing is satisfactorily completed,
THEN assign configuration control numbers, with current revisions, to the database and the application programs.

[5] Document the configuration control numbers on the PI&DP form and update the master configuration control listing.

[6] Update the Master database and software revision listing to reflect the most current approved revisions of the computer system components.

8.2.14 Deliver User Training

IR Developer

[1] Deliver training to all involved users.

[2] Ensure that users understand and operate the system properly, and are aware of the contents and meaning of the User's Manual.

[3] Document the training conducted, and forward training rosters to DM&RS.

8.2.15 Develop Installation Test Plan and Production Release Memo

IR Developer

[1] Prepare an installation test plan describing the steps required to verify successful software installation and integration with the existing database structure and/or application programs.

The installation test plan instructs the CCA which files to delete and add, sequence of steps, how to conduct the test, and what constitutes an acceptable result.

8.2.15 Develop Installation Test Plan and Production Release Memo (continued)

IR Developer (continued)

[2] **IF** needed,
THEN develop test cases (or adopt from the previous test plan used to validate software function) to verify complete installation and integration.

[3] **IF** the modification will affect other applications or structures,
THEN develop test cases that will confirm the proper function of these unmodified applications and database structures that could be affected by installation of the current release.

[4] Distribute the Installation Test Plan to the CSM and CCA for review and approval.

CSM, User

[5] Review and approve the completed installation test plan.

IR Developer

[6] Prepare a production release memorandum that describes the new system capabilities and provides release instructions that assure orderly installation.

An orderly installation minimizes operational impacts prior to installation test and production release.

CSM/CCA and IR Lead

[7] Review and approve the release memorandum.

CCA

[8] Distribute memorandum to all affected parties, including affected user organizations.

8.2.16 Install and Test

CCA

[1] Install software modification according to the memorandum.

[2] Update the master system configuration control documentation that provides a current revision listing of all:

- Applications.
- Database management systems.
- Operating systems.
- Database structures.

IR developer

[3] Conduct integration testing according to the installation test plan memorandum.

8.2.16 Install and Test (continued)

IR Developer (continued)

[4] **IF** test results are **NOT** satisfactory,
THEN the developer, CCA, USM may return to whatever development phase is necessary to correct the installation package.

CCA

[5] **IF** error conditions result,
THEN perform the following, as appropriate:

[A] Remove the new configuration.

[B] Restore the original configuration.

[C] Return the installation package to the IR developer.

The CCA is prohibited from correcting error conditions.

8.2.17 Retirement

CSM

[1] Determine requirements for orderly computer system retirement, including:
- Removal of database and application program from the server.
- A list of archived records.
- A retention schedule for archived records.

[2] Document retirement requirements on a memorandum.

[3] Distribute the draft retirement memorandum for review and approval to the:
- IR Lead.
- Affected user organizations.
- DM&RS.

[4] **WHEN** the retirement memorandum has been approved,
THEN supervise the removal of the application program, data, and database structure from the server and archival of storage media in accordance with the instructions on the retirement memorandum.

IR System Administrator

[A] Remove the:
- Application program.
- Data.
- Database structure.

8.2.17 Retirement (continued)

IR System Administrator (continued)

[B] Copy specified records on magnetic or other storage media.

[C] Forward records to DM&RS.

DM&RS

[D] Archive retired records in accordance with the requirements of the retirement memorandum.

8.3 Level 2 Software

8.3.1 Requirements Specification and Design

CSM

[1] Prepare a system requirements specification and design for the desired system configuration change.

Parts or all of the templates provided in this plan may be used as a guide.

8.3.2 Systems Development and Program Description Document Preparation

CSM

[1] Prepare the software code and supporting documentation ensuring that the following criteria are met:

- Comment executable instructions (code) to indicate the code's function
- Ensure that the level of detail of code comment is such that an independent developer previously uninvolved with the program can understand the functions and purpose of each module of code
- Design code in a modular construction. A module is defined as a group of executable instructions that performs a specific task or subtask
- Limit module size, whenever possible, to less than 100 lines of code

[2] Prepare a program description that includes a database dictionary and descriptions of the:

- Software function.
- Purpose and structure.
- Formatting.
- Hardware and software.
- Data flow.
- Naming conventions for variables, constants, and files.

8.3.3 Acceptance Test and Installation

CSM

[1] Prepare an inspection and installation test plan designed to emulate production conditions and verify correct software design.

DM&RS

[2] Evaluate the acceptability of the design specification, program description documents, and test plan.

[3] Document the evaluation in a memorandum.

[4] Archive all documents generated in this subsection in the central file.

9. IMPLEMENTATION PLAN

DM&RS, RFEDS

[1] Inventory affected software systems.

[2] Identify programs that are likely to be affected by a SMP by September 30, 1994.

IR

[3] Provide Level 1 Software IR procedures for:

- Configuration control.
- Development.
- Testing.
- Production (day-to-day operations).

[4] Prepare procedures and obtain CSM approval.

[5] Provide developer training and indoctrination.

[6] Implement by December 31, 1994.

IR, RFEDS

[7] Upgrade the Level 1 software development status tracking system to provide status information based on the following:

- Task
- Level of effort estimation
- Resource loading of available staff

[8] Include the following in the status information:

- Level of effort by project
- Milestone completion dates
- Percentage complete

[9] Base the status tracking system on Microsoft Project software, and implement for RFEDS development activities by December 31, 1994.

ERPD, DM&RS

[10] Assign personnel to support records management and quality control hold points described in Section 8.

[11] Estimate records storage space requirements to support this plan.

[12] Obtain records storage space.

[13] Complete Steps [10], [11], and [12] by December 31, 1994.

9. **Implementation Plan (continued)**

ERPD, Director, Direct Reporting Manager

[12] Designate a CSM for internally generated software by September 15, 1994.

CSM, IR Lead

[13] Assign a Configuration Control Administrator for RFEDS by December 1, 1994.

CCA, CSM, IR Lead

[14] Perform baseline analysis of ERPD software by December 31, 1994.

[A] Document specific configuration of all application programs, database structures, data management systems and operating systems.

RFEDS

[15] Develop SMP training and indoctrination.

[A] Prepare a brief indoctrination course to explain responsibilities and actions for software management.

[B] Identify the target audiences.

[C] Determine the frequency of training.

[16] Deliver the training to all affected personnel by December 31, 1994.

ERPD

[17] Implement the software management plan by December 31, 1994.

10. **RECORDS**

Management of all records is consistent with 1-77000-RM-001, Records Management Guidance for Records Sources.

The records generated as a result of this plan are considered quality records and are managed in accordance with 3-21000-ADM-17.01, Records Capture and Transmittal. The records generated as a result of this procedure are also considered potential Administrative Records and are managed in accordance with 3-21000-ADM-17.02, Administrative Records Screening and Processing in addition to 3-21000-ADM-17.01.

Submission of record copies to the ERPD Project File Center (PFC) will satisfy Administrative Record requirements.

10. Records (continued)

CSM, USM

[1] Ensure that the original and one copy of the following quality related records, as appropriate, are transmitted to the PFC in accordance with 3-21000-ADM-17.01:

[A] For Level 1,

- System change requests
- Functional requirements specifications
- Conceptual design and alternatives analysis
- Detail designs
- User's manual
- Training guide
- Test plans
- Test reports
- PI&PD forms
- Installation test plans and reports
- Production release memos
- User training rosters

[B] For Level 2,

- Requirements Specification and Design Document
- Program Description
- Test Plans and Reports
- Software Program Code (a printout of code)
- Memoranda documenting test results disposition

11. REFERENCES

DOE Order 1330.1D, "Computer Software Management," May 18, 1992

DOE Order 1360.1B, "Acquisition and Management of Computing Resources," January 7, 1993

DOE Order 1360.3C, "Information Technology Standards," October 19, 1992

DOE Order 1360.4B, "Scientific and Technical Computer Software," December 31, 1991

DOE Order 5700.6C, "Quality Assurance," August 21, 1991

EG&G Rocky Flats Quality Assurance Manual

IEEE Std. 730.1 - 1989, "IEEE Standard for Software Quality Assurance Plans," Institute of Electrical and Electronics Engineers, October 10, 1989

11. References (continued)

RFP/ER-MP-QAPD, Envronmental Management Quality Assurance Project Plan

RFETS Policy 3-45, Computer Software Management

RFETS Policy 7-21, Information Resources

1-45000-CSM-001, Computer Software Management

1-77000-RM-001, Records Management Guidance for Records Sources

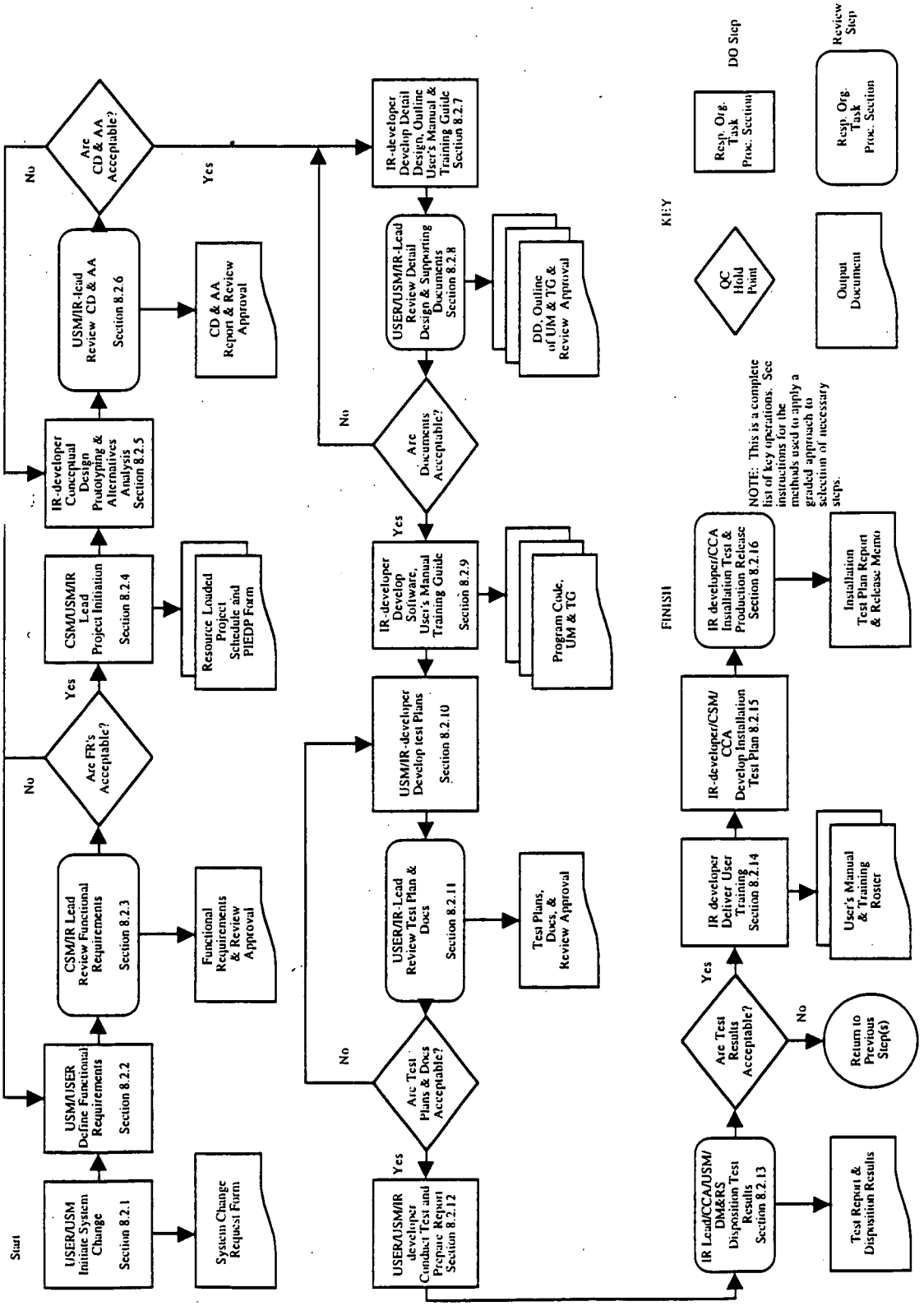
3-21000-ADM-17.01, Records Capture and Transmittal

3-21000-ADM-17.02, Administrative Records Screening and Processing

APPENDIX 1

Page 1 of 1

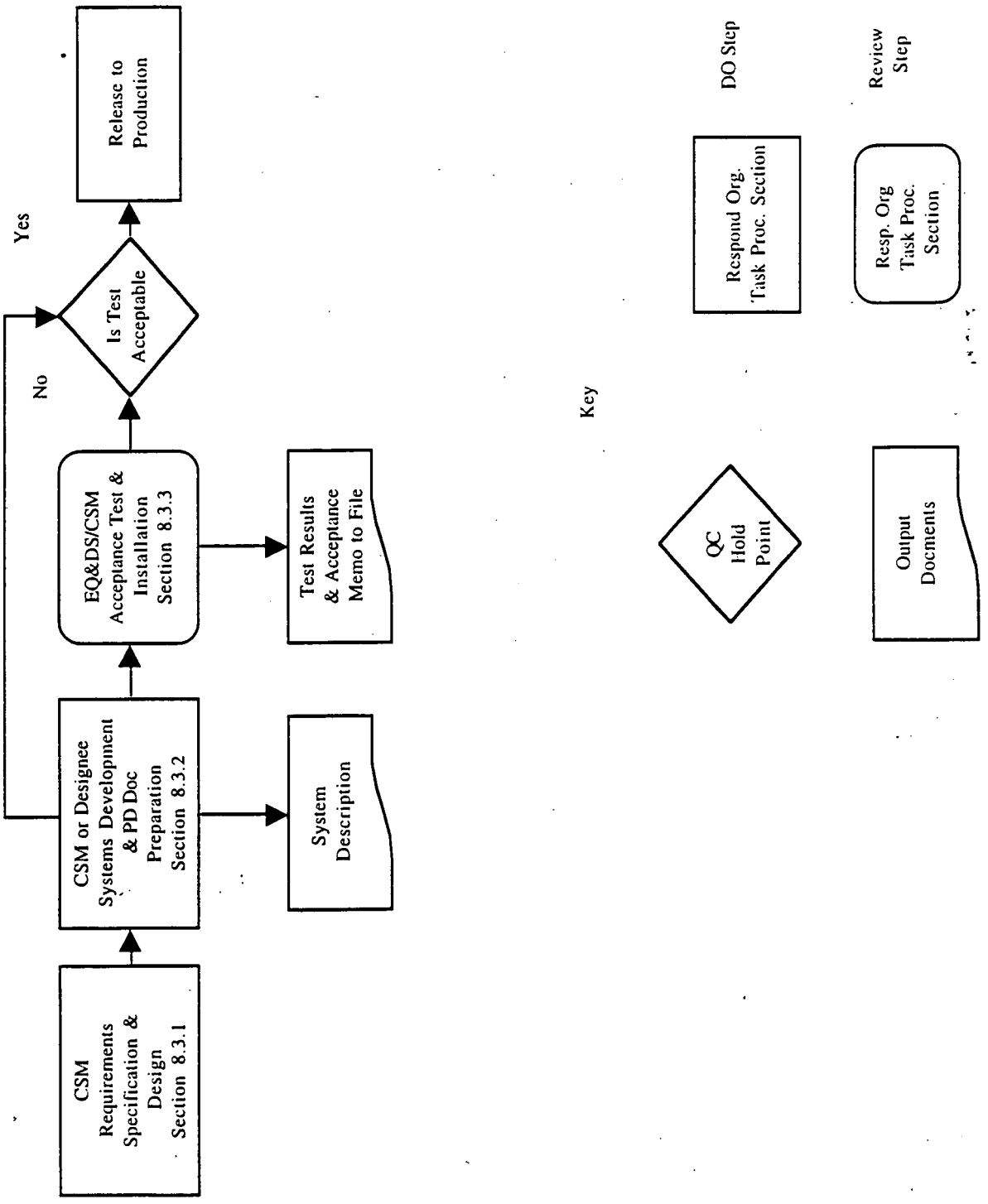
LEVEL 1 SOFTWARE MANAGEMENT FLOW CHART



APPENDIX 2

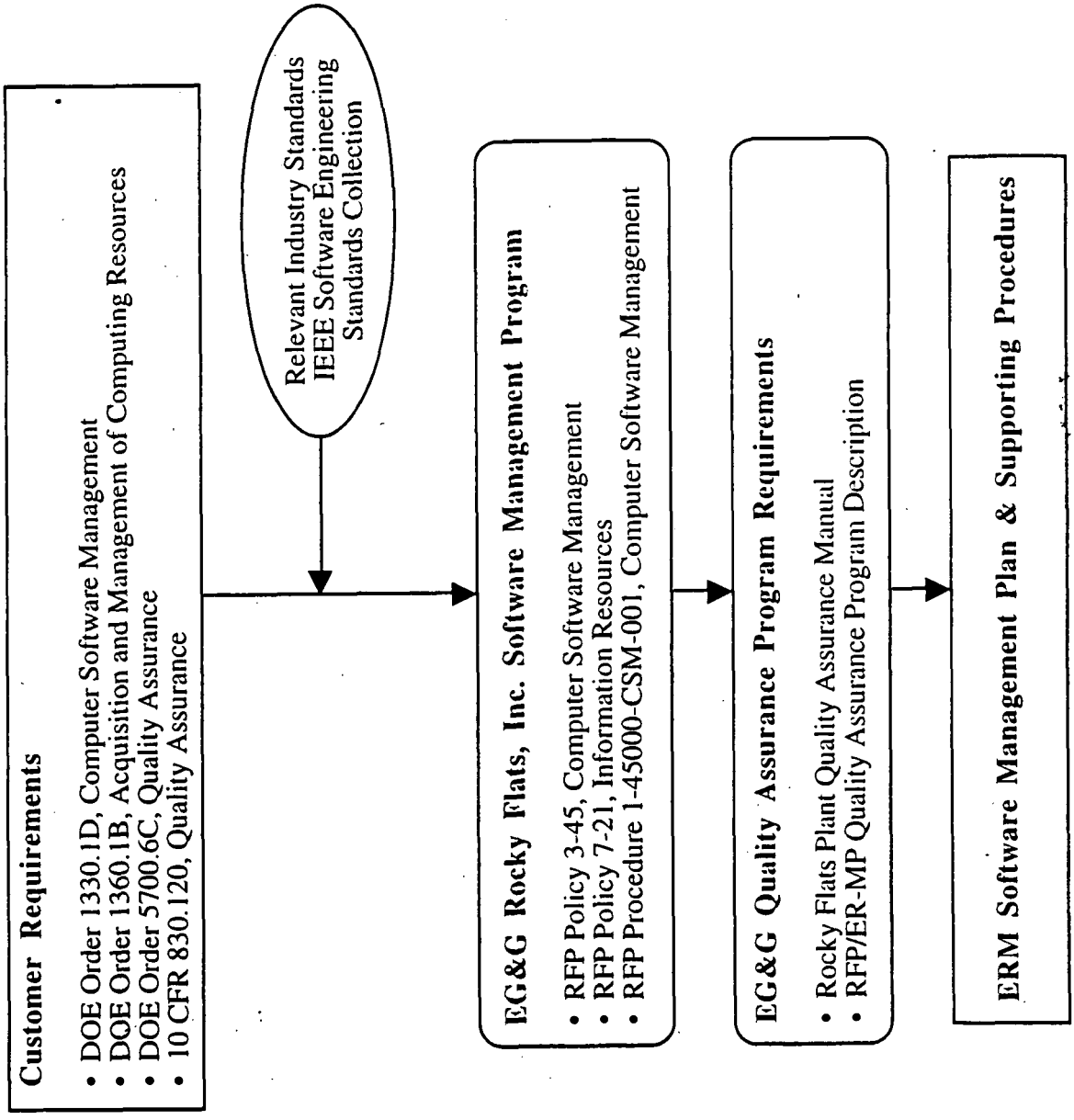
Page 1 of 1

LEVEL 2 SOFTWARE MANAGEMENT FLOW CHART



APPENDIX 3
Page 1 of 1

REQUIREMENTS HIERARCHY



APPENDIX 4
Page 1 of 1

ERPD SOFTWARE INVENTORY LOGSHEET

ERPD SOFTWARE INVENTORY LOGSHEET PAGE ____

Program Name	Developer or Computer System Manager	Primary User(s)	Software/Hardware Used	Purpose	Control Level Designation

APPENDIX 5

Page 1 of 1

SYSTEM CHANGE REQUEST FORM

Software Name _____

Software Change Request Number _____

Requester _____ Phone ext. _____ Date __/____/____

Description of Software Action/Requirements: (attach additional sheets if needed)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Justification for Change:

_____

_____

How will this change impact existing operations and data processing systems?

_____

_____

APPENDIX 6
Page 1 of 9

FUNCTIONAL REQUIREMENTS DOCUMENT PREPARATION GUIDE

1.0 Configuration Control Tracking Information

Software Name _____

Software Change Request Numbers Addressed by This Project

_____

_____

Configuration Control Number(s) Assigned to This Project

_____

_____

IR SSR Number(s) Assigned to This Project

_____

_____

IR Developer and Primary Alternate Assigned to Project Development

_____

_____

2.0 INTRODUCTION

<This section gives an introduction, mission statement, and business purpose statement for the system. It states the purpose, and specifies scope of the document. It defines any terms, abbreviations, or acronyms unique to this document. This section states the reference used in conjunction with writing or using this document. This section states the change control and maintenance aspects of the document. Also, this section covers the following: 1) Background Summary (in Brief); 2) Existing System Summary(ies) (in Brief); and 3) Deliverables.>

2.1 Mission and Business Purpose

<This subsection states the mission and business purpose driving the system and what this document will provide.>

APPENDIX 6
Page 2 of 9

EXAMPLE:

The Sample Management Office, as part of its mission is required to collect and manage environmental sample data for the Environmental Restoration and Environmental Protection organizations within EG&G Rocky Flats. This document will detail the requirements for developing a database to store and manage this data.

2.2 Scope

<This subsection states the limits of this document.>

EXAMPLE:

The scope of this document defines the near term requirements for developing the database. This database will contain analytical data of a chemical nature only. Other environmental data such as Ecological or Biological will be addressed at a later time.

2.3 Definitions

<This subsection defines the terms, abbreviations, and acronyms that are unique to this document.>

EXAMPLE:

ACRONYM	DESCRIPTION
EDD	Electronic Data Deliverable - this represents the sample data as delivered via floppy disk. It is in a pre-defined format.

2.4 References

<This subsection states the references used in conjunction with writing or using this document.>

EXAMPLE:

This software shall be developed such that it is compliant with the GRASSP Rev 1.0, October 4, 1988.

2.5 Background Summary (in Brief)

<This subsection will be used if there is an existing system. This subsection describes, in brief, the background of the existing system. Only information pertinent to the development of the new system, such as interfaces, will be restated here.>

APPENDIX 6
Page 3 of 9

EXAMPLE:

The existing environmental database system was developed at a time when only a single user system was needed. This has changed due to a recent order by the DOE.

3.0 DESIGN CONSTRAINTS

<This section defines the design constraints that are imposed on the software by existing standards and regulations, hardware limitation, operational considerations, database and software interactions and considerations, training, language, or nature of the software. Any element that could constrain the physical design is described here.>

3.1 Key Assumptions

<This subsection defines the assumptions relating to the system at the logical level, and if known, at the physical level. One key assumption is that sufficient resources shall be allocated to complete the project.>

EXAMPLE:

The following assumptions should be considered when developing this software system.

3.1.1 Users will all reside within the Interlocken facility.

3.2 Operational Considerations

<This subsection identifies and lists other applications and users affected by the proposal modification.

EXAMPLE.

3.2.1 Users will be using either Macintosh or IBM Personal Computers in their desktop environment.

4.0 REQUIREMENTS

<This section specifies, describes and defines the basic requirements of the system. These include descriptions of data inputs, outputs, units, tolerances, algorithms, and concepts.>

APPENDIX 6
Page 4 of 9

4.1 Requirements Description

<This subsection relates the 'user' view of the system, it is structured in English and reflects a conversational interchange between the user and designer as to what the system consists of, what it should do, how it should do it and what other systems will be impacted by it.>

4.2 Input Requirements

<This subsection identifies the basic sources and type of input to the system.>

EXAMPLE:

The input to the Lab Load system will be an EDD formatted diskette. Each diskette will contain only one ASCII file.

4.3 Output Requirements

<This subsection identifies the primary system output requirements.>

EXAMPLE:

Output of the Lab Load system will consist of data being loaded into appropriate analytic tables. There will also be one report. This report will identify records found to of an inconsistent nature. The report will be formatted as described in Appendix B.

4.4 Conceptual Requirements

<This subsection provides the designers with a 'heads up' as to how the users see the system being constructed. Often this subsection will allow the designers insight to factors which might impact table normalization etc.>

EXAMPLE:

Based upon recent discussions with users, it is likely that additional columns/data elements will be added by a future requirement. This should be considered when designing the table structures.

4.5 Logical Functional Model

<This subsection identifies that a functional model of the system will be required for use by the designers. This model will provide the information required by item 3.0. 4. 5. & 6.>

APPENDIX 6
Page 5 of 9

EXAMPLE:

A proposed flow chart of sample data collection is attached. This depicts the flow from field to labs to validators to database.

5.0 ATTRIBUTES

<This section defines the attributes pertaining to non-time related issues such as portability, efficiency, flexibility, reusability, security, or maintainability.>

5.1 Portability

<This subsection identifies any user requirements which impact the design and development of the system.>

EXAMPLE:

This system must be developed in a way that it can be implemented at other sites using standard RDBMS system such as ORACLE, DB2, etc.

5.2 Security

<This subsection identifies and quantifies system security aspects as seen by the user.>

EXAMPLE:

The system must be developed in a way that security can be administered by individual organizations within ERPD. This administrator is typically the Computer Systems Security Officer (CSSO).

5.3 Maintainability

<This subsection defines the requirements that the system be built in a manner such that if the original development staff is not available, other qualified personnel will be able to maintain the system as a viable entity.>

EXAMPLE:

The new environmental database system must be developed in a way that can be maintained using a separate machine for development and maintenance.

APPENDIX 6
Page 6 of 9

6.0 INTERFACES

<This section defines the interface requirements imposed on the system to satisfy user (man-machine, i.e. menus), hardware (machine-to-machine), and communications needs.>

6.1 Menu Driven

<This subsection identifies the primary types and levels of menus as seen by the user.>

EXAMPLE:

The user interface to the Lab Load system should have three main menu options.

Update Samples
Run Reports
Commit Updates

6.2 Forms Layout

<This subsection provides the first look at how the user feels the forms should appear and what they should contain.>

6.3 Output Compatibility

<This subsection identifies the types of system output which the user feels are required. Normally the backup and recovery output is not referenced at this time.>

EXAMPLE:

The reports printed must be compatible with both the HP Laser Jet 3 and the Apple printers.

6.4 System Management

<This subsection defines how the user feels they should manage the system in the operational environment.>

EXAMPLE:

The User System Manager should have the ability to manage users per the security requirements laid out in section 5.2.

APPENDIX 6
Page 7 of 9

8.0 PERFORMANCE REQUIREMENTS

<This section defines performance requirements (time-related issues) of the software or database, such as processing speed, throughput, or recovery time, as well as any size-related requirements, such as storage requirements; the number of simultaneous users to be supported; number of files and records to be handled; and size of records, tables, and files.>

8.1 Recovery Time

<This subsection sets requirements which limit system downtime.>

EXAMPLE:

In the event of a system failure, all data must be recovered within 12 hours to satisfy the requirements set forth by DOE, CDPHE and EPA.

8.2 Multiple Use

<This subsection establishes the system requirements for multiple users.>

EXAMPLE:

The number of simultaneous users is anticipated to be between five and seven for this lab upload program.

8.3 Data Elements

<This subsection provides a description of each element, including length, type, and number of occurrences. >

EXAMPLE:

This application will require one additional table to store Ecology related data. See the attached description of data elements for this table.

8.4 File and Record Size Requirements

<This subsection provides the first insight on file size, possible file dynamics, and expected record size requirements.>

APPENDIX 6
Page 8 of 9

EXAMPLES:

1) The total number of characters in each row of this table will be 369.

2) Initially this table will be loaded with approximately 4,000 rows of data. This is anticipated to grow at a rate of approximately 1,000 rows per month throughout lifecycle of software.

8.5 Response Requirements

<This subsection reflects the requirement for response in a distributed or remote system. The information must include:

- maximum response time based upon status of system.
- average expected response time based upon status of system.
- staging factors for responses if the system implementation is to be phased.
- identification of test and production response differences if acceptable.

Any other response oriented factor which would modify the value of the system to the user.>

EXAMPLE:

The new lab load system must be capable of loading a 10,000 record file within 5 min during peak system loading time.

9.0 TEST AND INSTALLATION PLAN REQUIREMENTS

<This section specifies requirements for software user testing and final installation, including specific definition of test cases and acceptance criteria. This section must define the test cases and datasets necessary to demonstrate that the completed modification fulfills selected requirements specified herein. The degree of accuracy desired or required, any qualification of the quantitative requirements of the comparisons, is also stated. Test requirements must be appropriate to the system under development. Installation test criteria for large modifications should prepare test cases that demonstrate that installation of the current release has not adversely effected other program applications or databases. Whenever possible, numeric acceptance criteria shall be established and validated through appropriate test cases.>

EXAMPLES:

1) Prior to implementation of this system, the input screens will be compared on a field by field basis with input requirements laid out in Appendix 3.

APPENDIX 6
Page 9 of 9

2) The lab QC program shall successfully calculate 100% of duplicate results using test cases of 30 paired, pre-calculated duplicate results in each of the following parameter groups: volatile organics, semi-volatile organics, inorganics, water quality parameters, pesticides, and herbicides.

3) Validation of the new system will be accomplished using the development server. Tests will be performed by SMO personnel running at least ten different data uploads. All uploaded files will be checked against original files. File correspondence must be 100%.

10.0 REVIEW AND APPROVAL RECORD

<This section provides a signature record indicating that all reviewers have approved the functional requirements as necessary and sufficient to satisfy the involved users and applicable system change requests. The following signatures are required at minimum: the Computer System Manager, the IR-Lead, and involved technical managers (users) whose operations will be supported or affected by the change.>

Computer System Manager _____ Date _____
Name Signature

Computer System Security Officer _____ Date _____
Name Signature

IR-Lead _____ Date _____
Name Signature

Involved Technical Program Manager or User

_____ Organization _____ Date _____
Name Signature

Involved Technical Program Manager or User

_____ Organization _____ Date _____
Name Signature

APPENDIX 7
Page 1 of 4

PROJECT INITIATION AND DEVELOPMENT RECORD

1.0 Configuration Control Tracking Information

Software Name _____

Software Change Request Numbers Addressed by This Project

_____

_____

Configuration Control Number(s) Assigned to This Project

_____

_____

IR SSR Number(s) Assigned to This Project

_____

_____

IR Developer and Primary Alternate Assigned to Project Development

_____

_____

2.0 Required Development Steps

2.1 Functional Requirements Specification

Required? Yes _____ : No _____ Date Completed:_____
If no, reason why:

_____

User approval required? Yes _____ No _____

APPENDIX 7
Page 2 of 4

2.2 Conceptual Design and Alternatives Analysis

Required? Yes _____ No _____Date Completed:
If no, reason why:

User approval required? Yes _____ No _____

2.3 Baseline Configuration

Required? Yes _____ No _____Date Completed:
If no, reason why:

User approval required? Yes _____ No _____

2.4 Detail Design Specification

Required? Yes _____ No _____Date Completed:
If no, reason why:

User approval required? Yes _____ No _____

2.5 Alternatives Analysis

Required? Yes _____ No _____Date Completed:
If no, reason why:

User approval required? Yes _____ No _____

2.6 Notification of the Plant SMRB (Total Costs > $25K)

Required? Yes _____ No _____Date Completed:
If no, reason why:

User approval required? Yes _____ No _____

APPENDIX 7
Page 3 of 4

2.7 Test Plan

Required? Yes _____ No _____Date Completed:
If no, reason why:

User approval required? Yes _____ No _____

2. 8 User Acceptance Test Results Approval

Required? Yes _____ No _____Date Completed:
If no, reason why:

User approval required? Yes _____ No _____

2.9 Installation Test

Required? Yes _____ No _____Date Completed:
If no, reason why:

User approval required? Yes _____ No _____

2.10 User Training

Required? Yes _____ No _____Date Completed:
If no, reason why:

User approval required? Yes _____ No _____

3.0 Milestone Completion Dates (Completed by CSM)

<attach a resource loaded project schedule in lieu of completing this section>

3.1 Approved Design Completion Date: _____ Est. Hours: _____

3.2 Approved Test Plan Completion Date: _____ Est. Hours: _____

APPENDIX 7
Page 4 of 4

3.3 User Test Completion Date: _____ Est. Hours: _____

3.4 Installation Date: _____ Est. Hours: _____

3.5 User Training Delivery Date: _____ Est. Hours: _____

4.0 Rush Priority Authorization

<A Program Manager's signature is required if the priority of this project will affect completion dates of other ongoing projects. The requesting Program Manager signing below is responsible to resolve changes to priorities of any affected Program Manager's projects. The signatures below indicate that priorities have been revised to the satisfaction of all involved senior management. For more details on this process, see the priority resolution instructions in section 6.2.4 of this plan for Management's responsibilities .>

Print name, then sign:

_____

Requesting Program Manager Organization Date

_____

Affected Program Manager Organization Date

_____

Affected Project Manager Organization Date

Distribution:
Requestor(s)
IR Systems Manager
Project File

5.0 Processing and Work Priority Approvals

CSM Approval _____ Date ___/___/___

IR Lead Approval _____ Date ___/___/___

USM Approval _____ Date ___/___/___

Technical Program Manager or User Approval_____ Date / /

WORK PRIORITY ASSIGNED_____

APPENDIX 8
Page 1 of 3

CONCEPTUAL DESIGN AND ALTERNATIVES ANALYSIS TEMPLATE

1.0 Configuration Control Tracking Information

Software Name _____

Software Change Request Numbers Addressed by This Project

_____

_____

Configuration Control Number(s) Assigned to This Project

_____

_____

IR SSR Number(s) Assigned to This Project

_____

_____

IR Developer and Primary Alternate Assigned to Project Development

_____

_____

2.0 Conceptual Design

The CD takes the contents of the FRS and models the process using such techniques as Data Flow diagramming, entity-relationship diagramming, etc. Major components and interfaces are also described, along with a preliminary data dictionary. CDs should be sufficiently detailed to permit comparative evaluation of the design concepts and selection of the optimal alternative. The CD will be completed by the IR Developer and will contain the following:

2.1 INTRODUCTION

<This section describes the work request as contained in the FRS.>

2.2 CURRENT CONCEPTUAL MODEL

APPENDIX 8
Page 2 of 3

2.2.1 Process Model

<This section contains one or more Data Flow Diagrams illustrating the current conceptual system process, prior to the requested work. If the requested work is a new development, this section will remain empty.>

2.2.2 Data Model

<This section contains one or more entity-relationship diagrams illustrating the current conceptual system data design, prior to the requested work. If the requested work is new development, this section will be empty.>

2.3 NEW CONCEPTUAL MODEL

2.3.1 Process Model
<This subsection contains one or more Data Flow Diagrams illustrating the new system conceptual process, including interfaces to other existing systems. >

2.3.2 Data Model

<This subsection contains one or more entity-relationship diagrams illustrating the new system conceptual data design, including interfaces to other existing systems.>

2.4 DATA DICTIONARY

<This section contains a preliminary data dictionary based upon the available information presented in the Functional Requirements Specification (FRS).>

3.0 Alternatives Analysis

The AA evaluates the CD to identify alternate solutions. Each alternate solution should be clearly defined, along with an evaluation of the merits of each solution. This will be followed by a recommendation. The AA will be completed by the IR Developer and will contain the following:

3.1 INTRODUCTION

<This section describes the work request as contained in the FRS, with specific references to work request document numbers as appropriate.>

APPENDIX 8
Page 3 of 3

3.2 CONCEPTUAL DESIGN DESCRIPTION

<This section summarizes the contents of the CD. If the CD&AA are combined into one document as recommended, this section is omitted.>

3.3 ALTERNATE SOLUTIONS ANALYSIS

<This section details the possible alternative solutions, highlighting the specific advantages and disadvantages of each solution. At least two solutions shall be presented and compared. The alternate solutions shall compare and contrast: a) user impacts and relative ease of use, b) comparative capital, development, and maintenance costs, c) relative ease of development including ease of existing or future systems integration, d) ability of proposed solution to satisfy current requirements, and e) ability of proposed solutions to meet 5-year projected requirements. A recommended analysis approach is to create a table and objectively rank each solution on a numeric scale of 1 to 3 for the identified parameters a) through e). This summary table and the sources of supporting decisional information shall be included in the alternate solutions analysis section.>

3.4 RECOMMENDATION

<This section contains the recommended approach to implementing the requested work, explaining why this solution was chosen in opposition to the others presented in Section 3.0.>

4.0 APPROVALS

<This section demonstrates that this document has received independent review and is approved for use by the below signed parties>

IR Lead Approval _____ Date ___/____/____

USM Approval _____ Date ___/____/____

APPENDIX 9

Page 1 of 2

DETAIL DESIGN TEMPLATE

The DD expands upon the CD by specifying how the recommended solution from the AA is to be implemented. The DD must be sufficiently detailed that a programmer could write code directly from it. The DD will be completed by the IR Developer and will contain the following:

1.0 Configuration Control Tracking Information

Software Name _____

Software Change Request Numbers Addressed by This Project

_____

_____

Configuration Control Number(s) Assigned to This Project

_____

_____

IR SSR Number(s) Assigned to This Project

_____

_____

IR Developer and Primary Alternate Assigned to Project Development

_____

_____

2.0 Introduction

<This section describes the work request as contained in the FRS, with specific references to work request document numbers as appropriate.>

3.0 Logical Model

3.1 PROCESS MODEL

<This subsection contains one or more Data Flow Diagrams illustrating the physical process, including interfaces to other existing systems. >

APPENDIX 9
Page 2 of 2

4.1 MENU FORMATS

4.2 FORM FORMATS

4.3 REPORT FORMATS

4.4 FILE FORMATS

5.0 Data Dictionary

<This section contains a detailed data dictionary based upon the available information presented in the FRS, CD and AA.>

6.0 Pseudocode

< If appropriate for the particular project, a section containing pseudocode may be added for all major logic components.>

6.1 TRIGGERS

6.2 PROCEDURES

6.3 SCRIPTS

6.4 OTHER

APPENDIX 10
Page 1 of 2

TEST PLAN TEMPLATE

The TP defines and documents how the software will be tested to ensure that it meets software quality assurance requirements. The TP will be written by the IR Developer and will contain the following:

1.0 Configuration Control Tracking Information

Software Name _____

Software Change Request Numbers Addressed by This Project

_____

_____

Configuration Control Number(s) Assigned to This Project

_____

_____

IR SSR Number(s) Assigned to This Project

_____

_____

IR Developer and Primary Alternate Assigned to Project Development

_____

_____

2.0 Introduction

<This section describes the work request as contained in the FRS, with specific references to work request document numbers as appropriate. The features of the software are described; and an overview of how testing will check the functions of all software features is provided>

APPENDIX 10
Page 2 of 2

3.0 Test Requirements

<This section defines the requirements for software testing. Specifically, it addresses these areas:

- Required Tests and Test Sequence
- Required Ranges of Input Parameters
- Criteria for Establishing Test Cases
- Requirements for Testing Logic Branches
- Requirements for Hardware Integration
- Expected Output Values>

4.0 Acceptance Criteria

<This section identifies the quantitative criteria by which the customer will accept the software as meeting the original requested functionality requirements.>

5.0 Test Cases

<This section outlines specific test cases which are required to be performed to address all stated test requirements, and meet stated acceptance criteria. Test cases shall be designed to test all features or functional modules of the software.>

5.0 Test Procedure

<This section contains a procedure to direct the ER testing staff through the testing process. It must be oriented toward a non-technical user, and guide the use through all of the required test cases.>

6.0 Test Schedule and Staffing Needs

<This section provides a testing schedule, for situations where testing involves multiple testers, and/or the testing must take place over a period of days or weeks. This schedule lists the personnel involved and estimates the level of effort required to complete the test. If staff availability is a question, this section may need to be reviewed and approved by involved management.>

8.0 Approvals

<This section lists the required approvals, by organization and/or individual's name.>

Print name, then sign:

IR Lead Approval _____ Date ___/___/___

USM Approval _____ Date ___/___/___

APPENDIX 11

Page 1 of 2

TEST REPORT TEMPLATE

The TR documents the results of the testing process to ensure that all test requirements have been satisfied. The TR is written by the USM and contains the following:

1.0 Configuration Control Tracking Information

Software Name _____

Software Change Request Numbers Addressed by This Project

_____

_____

Configuration Control Number(s) Assigned to This Project

_____

_____

IR SSR Number(s) Assigned to This Project

_____

_____

IR Developer and Primary Alternate Assigned to Project Development

_____

_____

2.0 Introduction

<This section describes the work request as contained in the FRS, with specific references to configuration control numbers. The introduction describes the hardware configuration used, test date and personnel involved and all other conditions unique to the environment of the test.>

3.0 Summary

<This section contains a brief summary of the test, including program(s) tested, version(s), computer platform(s)/system(s), date(s) of testing, test personnel, etc.>

APPENDIX 11
Page 2 of 2

4.0 Test Results

<This section contains the specific results of each test case, in the following format.>

TEST CASES	Results	Acceptable (Y/N)	Corrective Actions Taken
TC#1	Program calculations for a sample of 30 paired duplicates matched spreadsheet calculations for all parameter groups	Y	None
TC#2	Sample data did not load properly into table 1A, about 10% of fields truncated.	N	Specified field length of 10 alpha characters for column 4 inaccurate. Sample number column 4 changed to 12 character alpha/numeric. Retest required.
TC#2 Retest	Sample data loaded at 100% accuracy.	Y	none

5.0 Test Disposition

<This section provides the overall assessment of an acceptable or rejected test result recommended by the verifiers or validators.>

6.0 Approvals

<The signatures of the involved testers, the organizations they represent, and the dates of assessment are included here>

EQ&DS _____ Date _____
Name Signature

USM _____ Date _____
Name Signature

User _____ Date _____
Name Signature

IR Lead _____ Date _____
Name Signature